



KENTUCKY TRANSPORTATION CENTER

**EVALUATION OF US 119 PINE MOUNTAIN
SAFETY IMPROVEMENTS
(Final Report)**



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College of Engineering



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In all that we do.

Research Report KTC-07-27/FR121-02-1F

**EVALUATION OF US 119 PINE MOUNTAIN SAFETY IMPROVEMENTS
(Final Report)**

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Kentucky Transportation Cabinet
Commonwealth of Kentucky

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EXECUTIVE SUMMARY

The Transportation Center at the University of Kentucky was requested to perform an evaluation of the safety improvement project over a 7.1-mile section of US 119 on the Whitesburg side of Pine Mountain in Letcher County to determine whether the types of improvements undertaken affected the overall safety of the roadway. Specific attention was given to the effects of a ban on truck traffic that was implemented in March 2001. In addition, there was a need to determine if the use of flexible design was successful after removal of the truck restriction by permitting trucks with dimensions up to the WB-50 design to travel across the mountain. As a follow-up to the reconstruction project, a survey was conducted to solicit opinions of the US 119 Pine Mountain Crossing Task Force. This report documents the following: 1) the overall history of the project, 2) analyses of crash data prior to and after implementation of the truck ban and during and after construction, and 3) results of a survey of stakeholders who made up the Pine Mountain Crossing Task Force.

The section of US 119 where the truck ban was placed had a crash rate of 430C/100MVM prior to the start of the truck ban with a critical rate factor (CRF) of 1.31 for this type of road and traffic volume. The adjacent section of US 119, which has a similar cross section but less grade and sharp curvature, had a rate of 161 C/100MVM which is less than the statewide average. The injury crash rate for the truck ban section was 91 C/100MVM which is almost identical to the statewide average. There were no fatal crashes in this section. About 61 percent of the crashes in this section involved a truck (compared to a statewide percentage of about 7 percent). Over the study period about 57 percent of the truck crashes involved an opposite direction sideswipe with about 39 percent a single vehicle crash. The crash rate during the truck ban and construction (March 2001 through December 2004) was 239 C/100 MVM. There were 17 truck crashes in the truck ban section during the ban with 16 involving an out-of-state driver. For the truck ban period of 3 years and nearly 10 months, the total number of crashes decreased by about 52 percent and the number of truck crashes by 71 percent. The crash rate after construction was completed and the truck ban was removed (2005 and 2006) was 218 C/100MVM. This compares to an average statewide crash rate for two-lane rural roads of 222 C/100MVM for the period 2004-2006. After construction was completed and the truck ban removed, crashes have remained nearly the same as during the ban, which is approximately one-half the number and rate before the truck ban and construction began.

Stakeholder survey results relative to the context sensitive design and solution applications indicate that a very high percentage of the respondents offered the opinion (“Strongly Agree” or “Agree”) that significant benefits were gained from the reconstruction project. Overall safety and mobility was improved according to 100 percent of the respondents. Minimizing disruption caused by the project indicated an agreement level of 73.9 percent. Impacts to the human environment (95.7 percent agreement) and natural environment (91.3 percent agreement) were minimized according to respondents. It was also found that 87 percent (“Strongly Agree” or “Agree”) indicated they were satisfied with their relationship with the project team.

1.0 INTRODUCTION AND BACKGROUND

The possibility of improvements to the section of US 119 in Letcher County crossing Pine Mountain had been discussed and studied on several occasions for nearly 30 years prior to initiating a safety improvement project. Cost estimates had been prepared in 1991 as part of a submittal to the Appalachian Development Highway System (ADHS) representing the alternative to tunnel through Pine Mountain. Another cost estimate was prepared in 1997 outlining an alternative to pursue relocating the roadway along the existing corridor.

The Pine Mountain Crossing Task Force (PMCTF) was formed in 1997 to represent public interests and provide recommendations in the development of reconstruction alternatives for US 119 over Pine Mountain. The Task Force was comprised of local and regional elected officials, resource agencies, and environmental groups. After meetings in 1997 and 1998, no consensus could be reached and the Task Force became inactive. During the summer of 2000, public pressure led to reviving the Task Force with the addition of 15 members representing a citizens' advisory group resulting in a total of 41 members. The Task Force was given the following mission:

To jointly and collectively engage in a series of open and honest conversations that address the challenges of providing a safe, environmentally sound, and fiscally responsible roadway from Oven Fork to Whitesburg in Letcher County. These conversations and those engaged in them will strive to respect the differing views and opinions of the individuals participating, while at the same time working toward a common goal.

In addition, the Task Force was given the assignment to recommend an alignment that was sensitive to both the human and natural environment. There were three alternatives evaluated and given consideration as a means of creating an improved and safe US 119 across Pine Mountain. Those alternatives were as follows:

1. Reconstruct US 119 along the existing alignment (Reconstruct Alternative)
2. Relocate US 119 to a corridor near the existing alignment (Relocate Alternative)
3. Tunnel through Pine Mountain under the existing road (Tunnel Alternative)

A series of Task Force meetings were conducted and facilitated by the Kentucky Transportation Cabinet (KYTC). There were also several individual meetings involving the Transportation Cabinet project team, resource agencies, and various local and state elected officials. There was agreement between the KYTC and the PMCTF that the Tunnel Alternative was the only alternative that would provide the region with a safe, environmentally sound and fiscally responsible roadway. This Tunnel Alternative was determined to be the only long-term solution and was confirmed with the signing of a resolution by members of the Task Force on July 10, 2001. The resolution was presented to the Transportation Cabinet on July 24, 2001; endorsed by the Cabinet, and announced

by means of a Public Notice in local newspapers. Additional detail related to the alternatives addressed is provided in Appendix A.

2.0 OVERVIEW OF EVALUATION

The safety improvement project for a section of US 119 across Pine Mountain in Letcher County was initiated as an interim effort to address safety issues related to roadway geometrics and specific problems related to truck traffic. The project involves sections of the road being improved over a 7.1-mile length at a cost of approximately \$52 million. A preliminary evaluation study by a consultant (Bernardin-Lochmueller & Associates) had identified specific problem locations in the greatest need for improvement (1). As a result, a contract was awarded to begin spot-improvement reconstruction of roadway sections in the summer of 2002. This improvement project was primarily for widening the roadway cross section to better accommodate large trucks using US 119 rather than change the alignment. Widening of the roadway included two categories of improvements as follows:

- Widen curves and provide pavement markings to allow a “buffer zone” between the opposing lanes to permit tractor trailers to offtrack and not intrude into the opposing lane. (There were nine separate sections of varying length where curves were widened to create this buffer between opposing lanes.)
- Create a passing lane to allow improved opportunities for passing over the length of the project. (There were eight separate three-lane sections of varying length constructed over approximately half of the project.)

The Phase 1 reconstruction (Whitesburg side of Pine Mountain) was completed, with a dedication ceremony on April 22, 2005. Additional contracts are to be awarded for completion of sections of US 119 on the Harlan side of Pine Mountain.

The Transportation Center at the University of Kentucky was requested to perform an evaluation of the safety improvement project on US 119 to determine whether the types of improvements undertaken have affected the overall safety of the roadway. Specific objectives were to determine the effects of a ban on truck traffic that was implemented in March 2001 and to determine if the use of flexible design to achieve the safety improvements was successful (by allowing the Transportation Cabinet to remove the truck restriction and permitting trucks with dimensions up to the WB-50 design to safely travel across the mountain). A follow-up task was added to the initial objectives to conduct a survey of representatives from the Pine Mountain Crossing Task Force.

The evaluation approach involved three phases over a period of approximately four years. Following is a brief description of the three phases.

Phase 1: Detailed analysis of crash data on US 119 prior to beginning the safety improvement projects. Maximum use was made of the crash analysis performed by the engineering consulting firm of Bernardin-Lochmuller and Associates as part of their

study completed in February 2001 (1). The focus was on the effects of the ban on truck traffic from this section of US 119 during the period between March 2001 and June 2002. A secondary analysis was to perform an evaluation of types and patterns of crashes, followed by a subjective projection of the anticipated changes in crashes resulting from the improvements. This phase of the project was completed in October 2003 and is documented as Research Report KTC-03-34 (2).

Phase 2: Application of the Interactive Highway Safety Design Model (IHSDM) to produce an estimate of the changes in number and types of traffic crashes (3). This analysis required detailed input of before and after geometric design parameters such as grade, curvature, lane widths, and shoulder widths. However, due to limited input data and the relatively inflexibility of the IHSDM to represent conditions such as a design/build reconstruction project, the output was not formally documented.

Phase 3: Traditional analysis of traffic crashes before the truck ban, during the truck ban and construction, and after completion of the safety improvement project. A secondary task within this phase of work was a survey of stakeholders who had served in an advisory role for the project and were formally titled the “Pine Mountain Crossing Task Force”. This report will serve as final documentation of the Phase 3 evaluation.

3.0 ANALYSIS PROCEDURE

Crash Analysis

The crash analysis included a review of crash data during the following three phases: 1) before implementation of the truck ban and the start of the safety improvement construction, 2) during the truck ban including the period of reconstruction, and 3) after the truck ban ended and construction ended. The truck ban started in March 2001, construction started in June 2002, and both the truck ban and construction ended in December 2004.

The before data were collected from January 1995 through March 12, 2001. The data collection period during the truck ban and construction was from March 13, 2001 through December 2004. Crash data were collected for the period of January 2005 through December 31, 2006 to represent two years after the end of the truck ban and end of construction.

The location of the crash was determined using milepoint data given on the police report along with other references to distances to an intersection or the nearest town. For the three periods of analysis, crash data were collected between milepoints 10.065 and 17.161. As a comparison control section, crash data were collected on US 119 between milepoints 1.4 to 10.0. This control section of US 119 is also scheduled for reconstruction and has a similar cross section. Figure 1 is a map showing the study section and control section. Photographs showing the truck ban signs at each end of the project and the reconstructed section of US 119 are presented in Appendix B.

Stakeholder Survey

A survey of members of the Pine Mountain Crossing Task Force was conducted to determine impressions and opinions regarding the US 119 reconstruction project. This project was considered to be an application of the principles of context sensitive design and solutions and the survey primarily addressed benefits achieved. Other questions addressed the level of stakeholder satisfaction with the project team and opinions concerning the need for additional work on US 119 across Pine Mountain. The survey was initially distributed at a meeting of the Task Force in Whitesburg on May 15, 2007. Follow-up surveys were mailed approximately one week later to those members not in attendance at the meeting.

4.0 CRASH DATA ANALYSIS

Crash reports from January 1995 through December 2006 were obtained. The truck ban started in March 2001 with reconstruction starting in June 2002. The location of the crashes was between milepoints 1.4 and 17.161. The truck ban and reconstruction was between milepoints 10.065 and 17.161 with data between milepoints 1.4 and 10 used as a comparison. Crashes involving trucks were identified. The types of crashes were summarized as well as the severity. Following is a summary of the crash data.

TIME PERIOD	NUMBER OF CRASHES			
	Project Section		Control Section	
	MILEPOINT		MILEPOINT	
	10.065-17.161		1.4-10	
	TOTAL	TRUCK	TOTAL	TRUCK
1995	23	15	9	2
1996	18	17	8	0
1997	28	11	7	1
1998	21	11	14	2
1999	24	17	10	2
2000	27	16	9	2
2001	13	8	14	3
2002	16	6	15	0
2003	10	3	11	0
2004	8	2	10	0
2005	12	1	24	6
2006	10	3	19	6
1 st year of truck ban	14	8	15	3
2 nd year of truck ban	15	4	14	0
3 rd year of truck ban	8	4	11	0
Average per year (3 yrs.)	12.3	5.3	13.3	1.0

Dates of Significance:

Truck ban start - March 12, 2001 (MP 10.065-17.161)

Construction start - June 2002

End truck ban and end construction - December 2004

After truck ban and construction - start January 2005

Information presented in the preceding tabulation indicates the following:

- There was an average of 23.5 total crashes per year with 14.5 involving a truck in the six years before the truck ban.
- During the truck ban on the project section, total crashes decreased by an average of 11.2 per year (48 percent) with a reduction in truck crashes of 9.5 per year (66 percent). For the entire truck ban period (March 12, 2001 through December 31, 2004), the total crashes were 11.3 per year with 4.2 truck crashes per year.
- In the first year after construction was completed with the truck ban removed, total crashes on the truck ban section remained approximately the same as during the ban with the number of truck crashes decreasing to only one.
- In the truck ban section, the total number of crashes during and after the ban was about one-half the number before the ban. This decrease appears to have resulted from the reduction in the number of truck crashes.
- When comparing crashes during (2001-2004) and after (2005-2006) the truck ban and construction activity, total crashes and truck crashes increased on the control section from an average of 12.5 total crashes per year before to 21.5 crashes after, and from an average of 0.75 truck crashes per year before to 6 crashes after.

There were 118 total crashes in the truck ban section (milepoint 10.065 to 17.161) in the five-year period of 1996 through 2000 (before the start of the truck ban in March 2001). The weighed average daily traffic (ADT) for this section is 2,121 with a crash rate of 430 C/100MVM. This compares to the statewide average rate for rural, two lane highways of 250 C/100MVM (4). The critical rate for this 7.1-mile section would be 328 C/100MVM giving a critical rate factor (CRF) of 1.31.

There were 45 total crashes in the 8.6-mile section immediately southwest of the truck ban section over these five years (1996 through 2000). The weighted ADT for this section is 1,776 with a crash rate of 161 C/100MVM which is below the statewide average. The only fatal crash which occurred during these years was in this section.

It appears that the average daily traffic within the study area was affected by the truck ban and construction activity. For example, the section of US 119 between milepoint 10.065 (KY 932) and milepoint 15.350 (KY 2035 or Little Cowan Road) had average daily traffic volumes that ranged from 2,020 in 1998 to 1,810 in 2000, and then decreased to 1,480 in 2004 (during the truck ban and construction), before increasing to 1,730 in 2005 after the truck ban was removed and construction ended.

There were only 9 injury crashes and no fatal crashes in the truck ban section between 1996 and 2000. The injury crash rate was 91 C/100MVM which is very similar

to the statewide average of 86 C/100MVM. The critical injury crash rate for this section is 134 C/100MVM with a CRF of 0.68.

There were 110 truck crashes identified in the truck ban section from January 1995 through December 2006. Of those crashes, 16 involved an injury with no fatal crashes. The most common type of crash involved an opposite direction sideswipe (63 crashes) with 43 being single vehicle. Almost all (107 crashes) were in a curve and on a grade. Only 20 crashes occurred during darkness. The milepoints of the truck crashes (as given on the police report) were analyzed to identify the high crash locations. Following are lists of the 0.3-mile and 0.1-mile spots with the highest number of truck crashes. Total crashes during the period from 1995 through 2006 are given as well as the number before, during, and after the truck ban.

HIGH CRASH LOCATIONS (0.3-mile and 0.1-mile spots)

Location (0.3-Milepoint Range)*	Number of Crashes			
	Total	Before	During	After
16.300 - 16.508	15	14	1	0
15.420 - 15.676	12	11	1	0
15.008 - 15.308	10	9	1	0
11.900 - 12.198	9	6	2	1
15.800 - 15.961	9	8	1	0
11.437 - 11.7	7	2	5	0
10.600 - 10.807	6	5	1	0
10.996 - 11.246	6	5	1	0
12.800 - 13.100	5	3	2	0
13.851 - 14.115	5	3	0	2
14.155 - 14.433	5	2	2	1

* 5 or more in 0.3-mile spot

Location (0.1-Milepoint Range)*	Number of Crashes			
	Total	Before	During	After
10.6 - 10.7	4	3	1	0
11.696 - 11.700	4	1	3	0
12.196 - 12.265	5	4	1	0
15.165 - 15.239	4	3	1	0
15.278 - 15.308	4	4	0	0
15.420 - 15.476	10	9	1	0
15.800 - 15.900	6	5	1	0
16.427 - 16.508	12	11	1	0

* 4 or more in 0.1-mile spot

The locations with the highest number of truck crashes were at spots where there was a very sharp curve with the pavement widened to provide a “buffer area” marked to allow for truck offtracking.

High-crash locations on US 119 in Pike County were identified in a previous research report which analyzed truck crashes (5). Three of the top ten CRFs for one mile sections on rural, two lane roads across Kentucky were on US 119 in Letcher County (milepoint ranges 15.0 to 16.0, 11.8 to 12.5, and 16.3 to 16.8) with the ranges of 16.3 to 16.8 and 10.7 to 11.6 also identified as having a high CRF. Several sections along this road were identified as having a high number of opposite direction sideswipe collisions.

There were 17 truck crashes in the truck ban section during the truck ban (March 13, 2001 through December 2004) with four involving an injury and no fatalities. The truck driver was cited in 14 of these crashes. Twelve of the 17 truck drivers were out-of-state with four from Virginia which is adjacent to Letcher County. Thirteen were an opposite direction sideswipe collision with four single vehicle. The direction of travel of the truck was nearly the same with 10 northbound and 7 southbound. Of the 17 truck crashes in the truck ban section during the truck period, 8 were in one of the 0.3-mile spots previously identified as having the highest number of truck crashes. Five of the crashes occurred in the 0.3-mile spot between milepoints 11.437 and 11.7.

There was approximately 14.5 months between the start of the truck ban and start of the reconstruction (March 2001 through May 2002). There were 23 crashes during this time period with 11 involving a truck. There were 21 crashes with five truck crashes in the 31 months of construction (June 2002 through December 2004).

The high percentage of truck crashes shows that the most effective method of reducing total crashes would be to either upgrade the roadway cross section to allow for the offtracking of trucks in the sharp curves or to reduce the number of trucks. Statewide for 1996 through 2002, truck crashes represented about 7 percent of all crashes (6) while trucks were involved in about 61 percent of all crashes in the truck ban section. The truck ban reduced the total number of crashes by about 48 percent and the number of truck crashes by 66 percent. The reductions in the period of both a truck ban and reconstruction were 66 percent in total crashes and 87 percent in truck crashes.

The crash rate during both the truck ban and reconstruction was 239 C/100MVM. The crash rate after construction was completed with the truck ban removed was 218 C/100 MVM. As noted previously, the crash rate prior to the truck ban and reconstruction was 430 C/100 MVM.

5.0 STAKEHOLDER SURVEY

A survey was conducted to determine impressions and opinions regarding the US 119 reconstruction project of members of the Pine Mountain Crossing Task Force. This project was considered to be an application of the principles of context sensitive design

and solutions and the survey primarily addressed benefits achieved. The context sensitive approach included involvement of a wide representation of stakeholders and development of a design solution for the US 119 reconstruction that improved the overall safety of the roadway section while maintaining the environmental and aesthetic features of the surrounding area. The survey was initially distributed at a meeting of the Task Force in Whitesburg on May 15, 2007. Follow-up surveys were mailed approximately one week later to those members not in attendance at the meeting. A total of 23 responses were received from approximately 45 members receiving the survey. A copy of the survey is included as Appendix C.

Results from the survey are presented in Tables 1 through 6 with a summary of the responses from 34 questions included in the survey. Tables 1 - 3 summarize Questions 1-3 which sought general information relative to the areas of concerns or expertise, phases of the project in which they participated, and previous project involvement. Opinions relative to the context sensitive design and solution benefits achieved were addressed in Questions 4-23 and are summarized in Table 4. In general, it appears that a very high percentage of the respondents offered the opinion (“Strongly Agree” or “Agree”) that significant benefits were gained from the reconstruction project. For example, 100 percent of the responses indicated “A sense of stakeholder and public ownership developed” and “Trust in the project team and the transportation agency increased”. A high percentage of respondents (91.3) also felt that the project was developed in a timely manner; however, a lower percentage (73.9) indicated that project was completed when expected. Impact to the human environment (95.7 percent) and natural environment (91.3 percent) was minimized according to respondents. Overall safety and mobility was improved according to 100 percent of the respondents. Responses to a question relating to minimizing disruption caused by the project indicated an agreement level of 73.9 percent.

Question 24 related to the stakeholders’ relationships with the project team. Results presented in Table 5 show that about one-third indicated they established a partnership with the project team and nearly 22 percent indicated they provided direction to the project team. Another 17 percent indicated that they had an informational relationship with the project team. It appears that these relationships were positive and the types of responses desired for the work of a stakeholder group with a project team.

Questions 25-34 were summarized in Table 6 and addressed stakeholders’ opinions concerning a variety of issues including; level of satisfaction, communication, truck ban problems, delays, and future work to address safety and mobility on US 119 at Pine Mountain. It was found that 87 percent (“Strongly Agree” or “Agree”) they were satisfied with their relationship with the project team. Over 95 percent indicated satisfaction with procedures to allow input to project decisions. Approximately 78 percent felt that open lines of communication were provided during the reconstruction project. Concerning the truck ban before and during construction, nearly two-thirds indicated it did not create significant problems. Opinions concerning delays crossing Pine Mountain before, during, and after construction were solicited. Those indicating “Strongly Agree” or “Agree” that delays were acceptable are as follows: 39 percent prior

to construction, 82.6 percent during construction, and 60.8 percent after construction. Nearly 87 percent indicated there was a need to reconstruct US 119 on the Harlan side of Pine Mountain. Concerning construction of a tunnel through Pine Mountain, approximately 74 percent felt the need still remained.

6.0 SUMMARY OF RESULTS

Crash Data Analysis

- The section of US 119 where the truck ban was placed had a crash rate of 430 C/100MVM prior to the start of the truck ban with a critical rate factor (CRF) of 1.31. The injury crash rate was 91 C/100MVM which is almost identical to the statewide average. There were no fatal crashes in this section. The adjacent section of US 119, which has a similar cross section but less grade and sharp curvature, had a rate of 161 C/100MVM which is less than the statewide average.
- Prior to the truck ban, about 61 percent of the crashes in this section involved a truck (compared to a statewide percentage of about 7 percent).
- The crash rate during the truck ban and construction (March 2001 through December 2004) was 239 C/100 MVM.
- The crash rate after construction was completed and the truck ban was removed (2005 and 2006) was 218 C/100MVM. This compares to an average statewide crash rate for two-lane rural roads of 222 C/100MVM for the period 2004-2006.
- For the total study period (1995 through 2006), 57 percent of truck crashes involved an opposite direction sideswipe, with 39 percent a single vehicle crash.
- The truck ban reduced the total number of crashes by about 52 percent and the number of truck crashes by 71 percent during its operation (for the entire truck ban period of March 12, 2001 through December 31, 2004).
- During the period with both a truck ban and reconstruction, the reductions were 66 percent in total crashes and 87 percent in truck crashes.
- There were 17 truck crashes in the truck ban section during the truck ban with 16 involving an out-of-state driver.
- The highest numbers of truck crashes were at locations with a sharp curve where the pavement was widened to provide a buffer area for truck offtracking.
- Total crashes and truck crashes increased on the control section from an average of 12.5 total crashes per year before to 21.5 crashes after, and from an average of 0.75 truck crashes per year before to 6 crashes after.

Stakeholder Survey

- A very high percentage of the respondents offered the opinion (“Strongly Agree” or “Agree”) that significant benefits were gained from the reconstruction project.
- All (100 percent) respondents indicated overall safety and mobility was improved.
- Level of agreement was 73.9 percent that project created minimal disruption.
- Impacts to the human environment (95.7 percent agreement) and natural environment (91.3 percent agreement) were minimized according to respondents.
- It was found that 87 percent (“Strongly Agree” or “Agree”) they were satisfied with their relationship with the project team.
- Opinions concerning acceptable levels of delays crossing Pine Mountain were as follows: 39 percent indicating acceptable delays prior to construction, 82.6 percent during construction, and 60.8 percent after construction.
- Nearly 87 percent indicated there was a need to reconstruct US 119 on the Harlan side of Pine Mountain.
- Concerning construction of a tunnel through Pine Mountain, approximately 74 percent felt the need still remained.

7.0 REFERENCES

1. *“Existing Conditions and Accident Analysis Study – US 119 from Partridge to Whitesburg, Letcher County, Kentucky”*, Bernardin-Lochmueller & Associates, Inc. February, 2001.
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3. Interactive Highway Safety Design Model, Office of Safety Research and Development, Federal Highway Administration, 2003.
4. Agent, K.R.; Pigman, J.G.; and Barrett, M.L.; “Analysis of Traffic Crash Data in Kentucky (1996-2000),” KTC-01-25/KSP2-01-1F, September 2001.
5. Pigman, J.G. and Agent, K.R.; “Investigation and Analysis of Heavy Truck Accidents,” KTC-98-5, April 1998.
6. Agent, K.R. and Pigman, J.G.; “Investigation of the Impact of Large Trucks on Interstate Highway Safety,” KTC-02-5/SPR248-02-1F, February 2002.

TABLES

STAKEHOLDER SURVEY SUMMARIES

Table 1. CONCERNS THAT YOU REPRESENTED ON THIS PROJECT

Concerns	Count	Survey Percentage	Response Percentage
Historical/Cultural	8	34.8	5.6
Archeological	7	30.4	4.9
Biological	9	39.1	6.3
Community/Economic/Area Development	11	47.8	7.6
Environmental Protection	11	47.8	7.6
Water Resources/Quality	10	43.5	6.9
Land Conservation	9	39.1	6.3
Law Enforcement	2	8.7	1.4
Corps of Engineers	2	8.7	1.4
Fish and Wildlife	6	26.1	4.2
Forestry	8	34.8	5.6
Office of the SHPO	1	4.3	0.7
Federal or State Elected Official	3	13.0	2.1
Local Government Jurisdiction/Official	2	8.7	1.4
Local Government Agency	1	4.3	0.7
Local Planning or Development Agency	5	21.7	3.5
City/County School System	2	8.7	1.4
Special Interest Group (National, State or Local)	7	30.4	4.9
Chamber of Commerce	6	26.1	4.2
Business or Property Owner	3	13.0	2.1
Interested Citizen	9	39.1	6.3
Transportation Planning	4	17.4	2.8
Transportation Design	2	8.7	1.4
Transportation Construction	2	8.7	1.4
Pine Mountain Crossing Task Force Member	13	56.5	9.0
Other (please specify)	1	4.3	0.7

Table 2. PROJECT DEVELOPMENT PHASES

Phases	Count	Percentage
Programming or long-range transportation planning	9	39.1
Project planning	10	43.5
Project design	5	21.7
Project construction	3	13.0
Maintenance or operations	1	4.3
Unsure	7	30.4

Table 3. NUMBER OF TRANSPORTATION PROJECTS YOU HAVE BEEN INVOLVED WITH

Response	Count	Percentage
2 to 3	2	8.7
More than 3	8	34.8
Only this one	11	47.8
None	2	8.7

Table 4. OPINION ON BENEFITS ACHIEVED

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
4. Stakeholder and public participation increased throughout the project.	52.2	43.5	0.0	0.0	4.3
5. A sense of stakeholder and public ownership developed.	47.8	52.2	0.0	0.0	0.0
6. Trust in the project team and the transportation agency increased.	47.8	52.2	0.0	0.0	0.0
7. The project was developed in a timely manner.	30.4	60.9	4.3	0.0	4.3
8. The project was completed when expected.	30.4	43.5	8.7	0.0	17.4
9. Opportunities for partnering or shared funding or in-kind resources	21.7	47.8	0.0	0.0	30.4
10. Opportunities for joint use and economic development improved.	39.1	39.1	4.3	0.0	17.4
11. Overall impact to the human environment was minimized.	34.8	60.9	0.0	0.0	4.3
12. Overall impact to the natural environment was minimized.	39.1	52.2	4.3	4.3	0.0
13. Overall mobility for users was improved.	56.5	43.5	0.0	0.0	0.0
14. Walkability was improved.	26.1	30.4	4.3	0.0	39.1
15. Bikeability was improved.	21.7	30.4	8.7	0.0	39.1
16. Overall safety (vehicles, pedestrians and/or bikes) improved.	60.9	39.1	0.0	0.0	0.0
17. Multi-modal transportation options were improved.	39.1	39.1	4.3	0.0	17.4
18. Community satisfaction was improved.	43.5	39.1	0.0	0.0	17.4
19. Quality of life for the community was improved.	56.5	34.8	4.3	0.0	4.3
20. The project is in keeping with the local government's land use plan.	30.4	13.0	0.0	0.0	56.5
21. Vehicle speeds are more appropriate.	30.4	52.2	0.0	0.0	17.4
22. Design features are appropriate to the surroundings and the community.	39.1	56.5	4.3	0.0	0.0
23. Disruption caused by the project was minimized.	30.4	43.5	8.7	0.0	17.4

Table 5. RELATIONSHIP WITH THE PROJECT TEAM

Response	Count	Percentage
We had an informational relationship.	4	17.4
We had a consultation relationship.	2	8.7
We established a partnership.	8	34.8
We provided direction.	5	21.7
No Answer	4	17.4

Table 6. SATISFACTION WITH PROJECT

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure	No Answer
25. I am satisfied with the relationship I had with the project team.	47.8	39.1	0.0	0.0	4.3	8.7
26. I am satisfied with the procedures and methods that allowed input to the project decisions.	52.2	43.5	0.0	0.0	0.0	4.3
27. I am satisfied with the level of information provided during construction.	39.1	43.5	0.0	0.0	13.0	4.3
28. Open lines of communication were provided during construction.	34.8	43.5	8.7	0.0	8.7	4.3
29. The ban on trucks before and during construction did not create significant	34.8	30.4	0.0	0.0	30.4	4.3
30. Delays were acceptable when crossing Pine Mountain prior to construction.	13.0	26.1	26.1	13.0	21.7	0.0
31. Delays were acceptable when crossing Pine Mountain during construction.	26.1	56.5	8.7	0.0	8.7	0.0
32. Delays are acceptable when crossing Pine Mountain now.	30.4	30.4	26.1	0.0	13.0	0.0
33. There is a need to reconstruct US 119 on the Harlan side of Pine Mountain.	73.9	13.0	0.0	4.3	8.7	0.0
34. The need still remains for constructing a tunnel through Pine Mountain.	65.2	8.7	8.7	4.3	13.0	0.0

APPENDIX A

Alternative Analysis for US 119 Pine Mountain Project

Provided below are additional details which supported justification for the alternative to tunnel through Pine Mountain.

Relocate Alternative:

- The Public Involvement process was not complete at the time of the 1997 ADHS Cost Estimate.
- The stakeholders (Kentucky Nature Preserves, Kentucky Department of Fish and Wildlife, local citizens, and elected officials) made it clear that the Relocate Alternative's impact was unacceptable to land owned by the Kentucky State Nature Preserves Commission (KSNPC) and the Pine Mountain Wildlife Management Area (PMWMA).
- Proposed encroachments of open cuts for the Relocate Alternative into the KSNPC and PMWMA areas would result in the potential loss of various endangered species and plants.
- Proposed waste areas would damage an untouched watershed or the waste areas would have to be relocated, resulting in an increase in cost by more than \$30,000,000.
- The Relocate Alternative had a minimum design speed of 50 MPH but still had many curves and vertical grades near 8 percent that would greatly slow any truck traffic, hindering economic development in the area.
- It was predicted that trucks crossing Pine Mountain would be unable to attain travel speeds of 50 mph as required by Appalachian Regional Commission (ARC) criteria.
- The Task Force concluded that the Tunnel Alternative's minimal impact to the PMWMA and no impact to the KSNPC property, in combination with safety and economic benefits, were preferred. As a result, the Task Force voted to eliminate the Relocate Alternative on April 17, 2001.
- The stakeholders felt that the safety and economic benefits of the Tunnel Alternative were preferred over the other alternatives.

Reconstruct Alternative:

- Input from stakeholders during the public involvement process made it clear that it was desirable to have roadway with safety features as a higher priority than the Reconstruct and Relocate Alternatives were perceived to provide.
- The Reconstruct Alternative had no design speed and basically provided an improvement that constructed passing lanes where feasible and reconstructed all curves so that semi-trucks could stay in their lane as they traversed curves. As a result, the anticipated travel speed on several portions of this roadway would be well under the required ARC criteria of 50 mph.

- The Reconstruct Alternative would result in open face cuts creating undesirable impacts on the Kentucky Nature Preserves and the Pine Wildlife Management Area.
- Proposed waste areas as part of the Reconstruct Alternative would have undesirable impacts and result in a cost of more than \$15,000,000.
- The proposed geometrics were perceived by the stakeholders as not only less safe than the Tunnel Alternative but also a continued barrier for economic opportunities.

Geotechnical Issues:

- Geotechnical investigations made after the 1997 ADHS Cost Estimate made it clear that open cuts on the south side of Pine Mountain would need to have much flatter slopes than originally estimated.
- Although Pine Mountain's unique steeply dipping and fragmented rock structure was known and considered during development of the Relocate Alternative, the core drilling conducted in early 2000 revealed a much steeper dip in rock structure than anticipated. The potential consequence was even greater impacts to land owned by the KSNPC on the south side of Pine Mountain. Results from geotechnical investigations indicated that the slope would extend over 2,000 feet before it could be matched to the original ground.
- It was predicted that there was an extremely high risk for rock failure associated with cutting into the mountain.

Summary

- It was concluded by the KYTC that providing an improved US 119 across Pine Mountain is a very complex project, with many conflicting issues of design criteria, constructability, environmental impacts, and funding.
- In July 2001, a renewed effort to involve all stakeholders in finding a "build alternative" to address and resolve these complex issues resulted in a conclusion that the KYTC estimate made for the 1997 ADHS Cost Estimate was not preferred.
- The three alternatives discussed have been consistently presented throughout more than 30 years by the KYTC as the most feasible alternative for US 119 crossing of Pine Mountain.
- There has been an agreement reached between the KYTC and the PMCTF that the Tunnel Alternative is the only alternative that would provide the region with a safe, environmentally sound and fiscally responsible roadway.

APPENDIX B

Photographs of Truck Ban Signs and Reconstructed US 119



Figure B1. Truck Ban Sign at North End (Whitesburg) of US 119 Project.

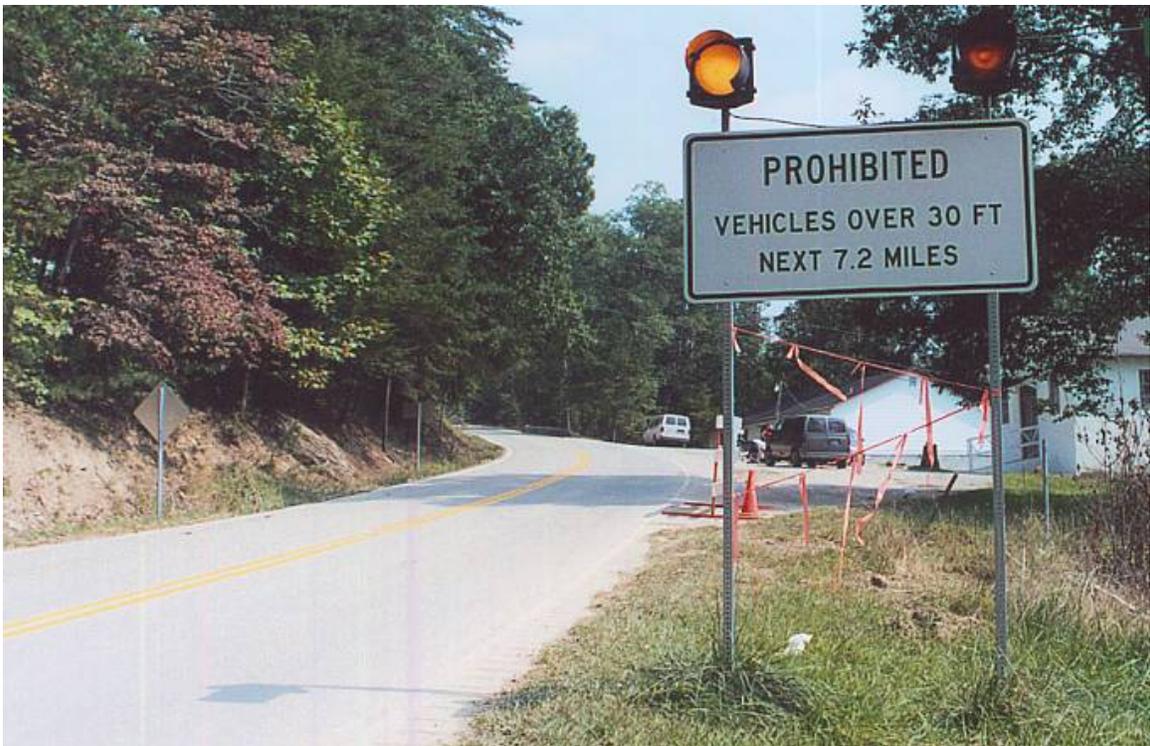


Figure B2. Truck Ban Sign at South End of Project.



Figure B3. Southbound on US 119 at Beginning of Project (M.P. 17.161) with Changeable Message Sign.

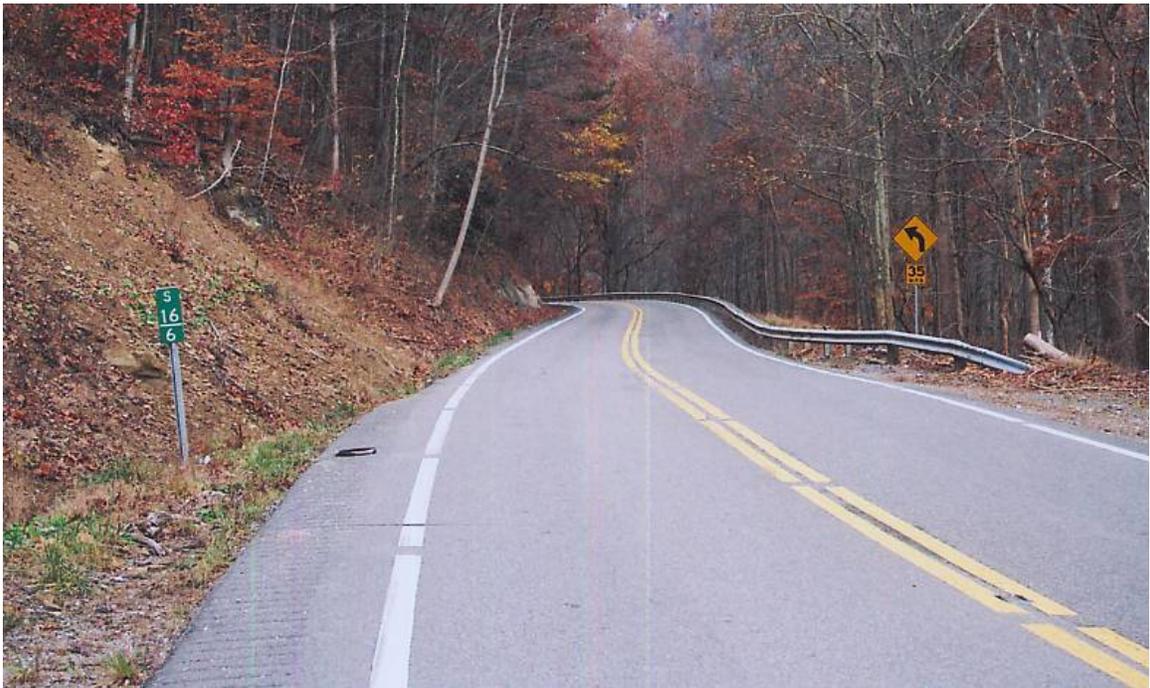


Figure B4. Southbound on US 119 at M.P. 16.6



Figure B5. Northbound on US 119 at M.P. 15.4



Figure B6. Northbound on US 119 at M.P. 13.0



Figure B7. Northbound on US 119 at M.P. 12.3 (KY 1679)



Figure B8. Northbound on US 119 at M.P. 12.1

APPENDIX C

Stakeholder Survey Form

1. About This Survey

This survey is important to the Kentucky Transportation Cabinet. We are collecting feedback from stakeholders and the public to measure our performance on recently completed projects. Knowledge from this survey will help us to improve our future planning, design and construction for transportation projects. We appreciate you taking the time to help us with this research.

This survey is for the recently completed US 119 Pine Mountain Reconstruction Project.

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2. Background Information

This information will provide researchers with some understanding of your perspective and involvement in this project.

1. Please mark **ALL** the areas or concerns that you represented on this project.

- Historical/Cultural
 - Archeological
 - Biological
 - Community/Economic/Area Development
 - Environmental Protection
 - Water Resources/Quality
 - Land Conservation
 - Law Enforcement
 - Corps of Engineers
 - Fish and Wildlife
 - Forestry
 - Office of the SHPO
 - Federal or State Elected Official
 - Local Government Jurisdiction/Official
 - Local Government Agency
 - Local Planning or Development Agency
 - City/County School System
 - Special Interest Group (National, State or Local)
 - Chamber of Commerce
 - Business or Property Owner
 - Interested Citizen
 - Transportation Planning
 - Transportation Design
 - Transportation Construction
 - Pine Mountain Crossing Task Force Member
 - Other (please specify)
-

2. Indicate all the project development phases you participated in on this project.

- Programming or long-range transportation planning
- Project planning
- Project design
- Project construction
- Maintenance or operations

Unsure

3. Indicate the number of transportation projects you have been involved with.

Only this one



2 to 3



More than 3



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3. Opinion on Benefits Achieved

We want your opinion on the extent to which benefits were achieved on this project. We realize that you may not have certain or complete knowledge of some of these benefits --please mark the "Unknown" choice for those.

4. Stakeholder and public participation increased throughout the project.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

5. A sense of stakeholder and public ownership developed.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

6. Trust in the project team and the transportation agency increased.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

7. The project was developed in a timely manner.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

8. The project was completed when expected.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

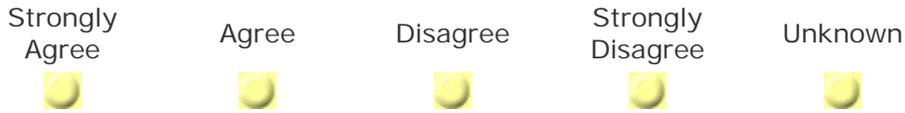
9. Opportunities for partnering or shared funding or in-kind resources increased.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

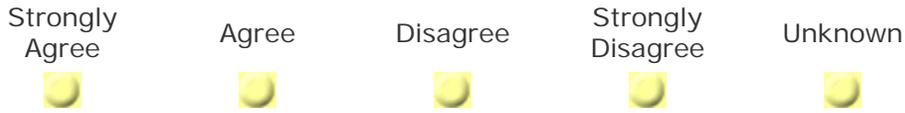
10. Opportunities for joint use and economic development improved.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

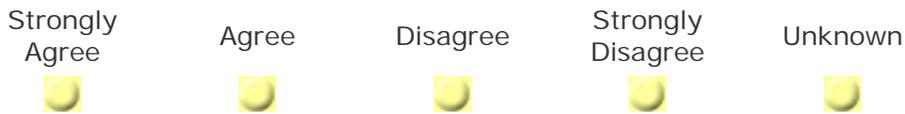
11. Overall impact to the human environment was minimized.



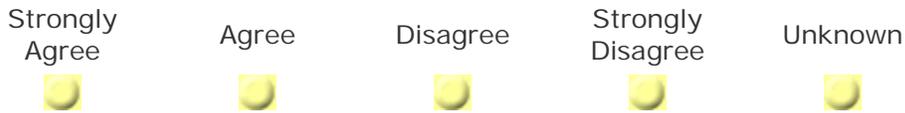
12. Overall impact to the natural environment was minimized.



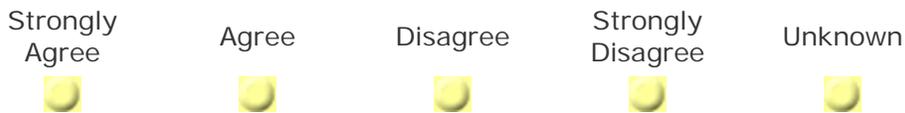
13. Overall mobility for users was improved.



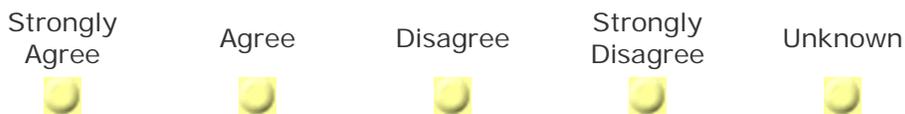
14. Walkability was improved.



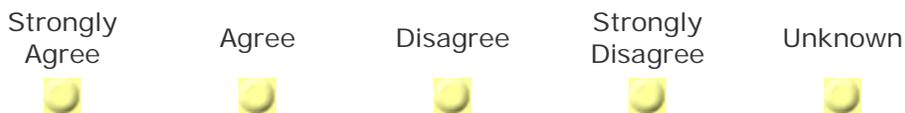
15. Bikeability was improved.



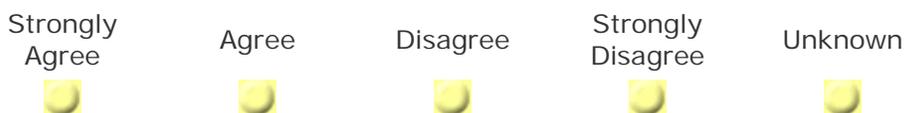
16. Overall safety (vehicles, pedestrians and/or bikes) improved.



17. Multi-modal transportation options were improved.



18. Community satisfaction was improved.



19. Quality of life for the community was improved.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

20. The project is in keeping with the local government's land use plan.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

21. Vehicle speeds are more appropriate.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

22. Design features are appropriate to the surroundings and the community.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

23. Disruption caused by the project was minimized.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unknown
<input type="radio"/>				

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4. Stakeholder Satisfaction

The research team would like to determine your opinions and level of satisfaction regarding the development of this project.

24. Which one of the following best describes your overall relationship with the project team?

- We had an informational relationship.
- We had a consultation relationship.
- We established a partnership.
- We provided direction.

25. I am satisfied with the relationship I had with the project team.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

26. I am satisfied with the procedures and methods that allowed input to the project decisions.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

27. I am satisfied with the level of information provided during construction.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

28. Open lines of communication were provided during construction.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

29. The ban on trucks before and during construction did not create significant problems.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

30. Delays were acceptable when crossing Pine Mountain prior to construction.

Strongly	Strongly
----------	----------

Agree

Agree

Disagree

Disagree

Unsure

31. Delays were acceptable when crossing Pine Mountain during construction.

Strongly
Agree

Agree

Disagree

Strongly
Disagree

Unsure

32. Delays are acceptable when crossing Pine Mountain now.

Strongly
Agree

Agree

Disagree

Strongly
Disagree

Unsure

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5. Thank You!

And finally, we would like your opinion on the possibility of future Pine Mountain roadway improvements.

33. There is a need to reconstruct US 119 on the Harlan side of Pine Mountain.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

34. The need still remains for constructing a tunnel through Pine Mountain.

Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
<input type="radio"/>				

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